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AN UNREASONABLE RULE IN SURVEYING.

By Professor P. H. PHILBRICK, M. S., C. E., Lake Charles, Louisiana.

The Government requires Surveyors, on account of the more rapid convergence of the meridians north of a parallel of latitude than south, to locate "correction parallels" every 24 miles north and every 30 miles south of the principal base. Where is the parallel of latitude from which the convergency for 24 miles north is equal to the convergency for 30 miles south? Let $x=$ the co-latitude of the required parallel. The arcs of two parallels included between two meridians are as their radii which are as the sines of their co-latitudes. Also 24 miles $=20'.85=a$ (say) and 30 miles $=26'.07=b$ (say).

Hence, we have $\sin(x+b)-\sin x=\sin x-\sin(x-a)$. Expanding it, $\sin x\,(2-\cos a-\cos b)=\cos x\,(\sin b-\sin a)$.

Therefore, $\tan x=\dfrac{\sin b-\sin a}{2-\cos a-\cos b}=\dfrac{\sin b-\sin a}{\text{vers}\,a+\text{vers}\,b}=32.16949.$

Hence, $x=88^\circ\,13'\,10''$ and $90^\circ-x=$latitude$=1^\circ\,46'\,50''$. The rule is not reasonable. The convergency upon each side of all parallels where surveys are made is sensibly the same.

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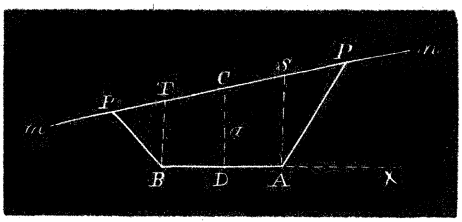
TO SET SLOPE STAKES WHEN THE SURFACE IS STEEP BUT SLOPES UNIFORMLY.

By J. M. BANDY, Professor of Mathematics, Elon College, North Carolina.



Let mn represent the surface of e ground. Let C represent the position of the centre peg, and let CD $(=a)$, the value of which is found from the level notes, represent the centre cut. The width of the road, BA, is b.

It is proposed to find what engineers designate as cuts at P, P', S, and T.

In the direction of P, and in connection with C, one setting of the rod determines the slope of the ground mn. Call this slope m. Now, since the co-ordinates of C are $(o,\ a)$, D being the origin of co-ordinates, the equation of the surface, mn, is $y=mx+a$.....(1).

The quality of the soil determines the slopes of PA and $P'B$. Call this slope m'. Since the co-ordinates of A are $(\frac{b}{2}\ ,\ o)$, the equation of PA is

$$y=m'x-\frac{m'b}{2}\ .....(2).$$

Combining (1) and (2), the co-ordinates of P are known. Hence, the